THAILAND'S ENERGY SECURITY POLICY

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ABSTRACT

Energy security policy remains the prime policy of Thailand as currently we depend heavily on energy imports, which makes the economy vulnerable to supply shortage. Implementation relating to energy procurement of an economy requires a lead-time, no matter whether it is the exploration and development of indigenous energy resources or negotiations with neighboring economies on energy cooperation and development, before actual energy supplies can take place. As a result, such implementation must be continuously pursued to ensure energy security of the economy in the long term.

Although Thailand's dependency on energy imports substantially decreased from 98% in 1980 to 63% in 2000, it is projected that fuel import dependency will increase to 70% over the next ten years. The past economic and oil price crises have provided lessons for Thailand with regard to the national energy policy and plan development. Therefore, in order to ensure energy supply security and sustainable energy development of the economy, Thailand's energy policy has placed greater emphasis on the promotion of indigenous energy resource development, diversification of energy supplies as well as utilization of renewable energy, and improvement of energy efficiency. However, due to the limited potential of domestic energy resources, Thailand also gives importance to energy cooperation with neighboring economies to enhance energy security.

In addition, emergency preparedness and measures are crucial to mitigate the impact of oil shortage or crisis. Being dependent on energy imports, especially oil, Thailand recognizes the importance of energy security planning. We have undertaken a study on *National Oil Stockpiling Strategy* to determine the feasibility and viability of establishing an official oil stock. Also, Thailand has given cooperation in improving the ASEAN Petroleum Security Agreement (APSA), hoping that its implementation would be as efficient as that of the IEA. Furthermore, Thailand is willing to share energy information and exchange energy dialogue at both intra-regional and inter-regional levels with a view to strengthening energy security in the region as a whole.

1. THAILAND'S ENERGY SITUATION

1.1 Energy Demand and Supply

(a) Primary Energy Demand: The primary energy demand in 2000, under the assumption that the economic growth rate was 4.2%, was at a level of 78,025 Ktoe, accounting for a growth rate of 3.5% compared with the 1999 records. Demand for natural gas, hydropower and imported electricity would increase at a high rate whereas renewable energy demand would slightly increase. On the other hand, petroleum demand would decrease by 0.6% since crude oil and petroleum products prices in this year were exorbitantly high, resulting in reduced consumption of petroleum products by the residential sector whereas certain commercial and industrial activities have turned to use natural gas instead of oil. Demand of lignite/coal would slightly decrease compared with that in 1999. Petroleum product demand would account for the highest proportion of the primary energy demand, sharing 45.9%. Next to this were natural gas, renewable energy, lignite/coal and electricity with a share of 24.4%, 18.0%, 9.7% and 2.0% respectively.

The economic growth rate during 2001-2005 is expected to be at a level of 4.3% - 4.7% and during 2006-2010 to be at a level of 4.5% - 4.7%. Consequently, energy demand during 2001-2005 is

forecasted to increase at an average rate of 4.4%. In this respect, petroleum demand will increase at an average rate of 2.8%, natural gas at 7.4% and lignite/coal at 7.8% since, pursuant to the Power Development Plan (PDP) of the Electricity Generating Authority of Thailand (EGAT), IPP coal-fired power plants are expected to become operational in 2005. It is anticipated that hydropower utilization will decrease at an average rate of 3.5% while renewable energy utilization will increase at an average rate of 3.1%.

Primary energy demand during 2006-2010 is forecasted to increase at an average rate of 4.9%, with increased consumption of all energy types, i.e. petroleum and natural gas will increase by 6.0% and 0.8% respectively, hydropower and imported electricity will increase at an average rate of 21.4% as there will be greater import of electricity from the Lao PDR in 2007. Lignite/coal will increase at an average rate of 9.6%. The share of each energy type in 2010 will not be much different from that in 2000, with petroleum still accounting for the highest share of 44.5%. Natural gas, lignite/coal, electricity and renewable energy will share 23.0%, 14.1%, 2.8% and 15.6% respectively.

Table 1: Forecast on Primary Energy Consumption

Energy Type	Consumption (Ktoe)				Growth (%)			Share (%)		
	1999	2000	2005	2010	2000	2001-05	2006-10	2000	2005	2010
Petroleum	36,004	35,806	41,048	54,832	-0.6	2.8	6.0	45.9	42.3	44.5
Natural Gas	16,774	19,039	27,264	28,324	13.5	7.4	0.8	24.4	28.1	23.0
Lignite/Coal	7,705	7,584	11,032	17,417	-1.6	7.8	9.6	9.7	11.4	14.1
Hydro & Imported Elec..	951	1,529	1,277	3,371	60.9	-3.5	21.4	2.0	1.3	2.8
Renewable Energy	13,963	14,066	16,350	19,217	0.7	3.1	3.3	18.0	16.9	15.6
Total	**75,397**	**78,025**	**96,971**	**123,161**	**3.5**	**4.4**	**4.9**	**100**	**100**	**100**

Thailand's dependence on the import of energy resources has substantially decreased, from 98% in 1980 to 63% in 2000. However, oil remains the major fuel import dependence of the economy.

1.2 Oil Demand and Supply

(a) Consumption of Petroleum Products: In 2000, demand for petroleum products was 611 KBD, a 4.2% decrease from the 1999 records. The major reason was that the prices of petroleum products during the year were so high that the overall petroleum consumption decreased. Consumption of gasoline decreased by 3.9% and that of diesel by 2.7%. The main reason for the decreased consumption of these two products was assumed to result from less use of cars by the general public. As for fuel oil, the consumption dramatically decreased by 19.7% compared with the 1999 records since EGAT had reduced the use of fuel oil for power generation and, as an alternative, turned to use more natural gas, which is clean fuel and is cheaper than fuel oil. Moreover, some industries had also shifted to use more natural gas instead of fuel oil. The share of consumption by product type in 2000 was as follows: diesel, 42.1%; gasoline, 19.0%; fuel oil, 18.0%; LPG, 11.0%; jet, 9.8% and kerosene, 0.1%.

Demand for petroleum products of Thailand in 2005 is expected to be 731 KBD, an average increasing rate of 3.7%. Demand for gasoline, diesel, jet and LPG tends to increase while demand for fuel oil will decrease. This will be in line with the policy on fuel utilization in power generation of EGAT, i.e. to reduce the use of fuel oil and to promote the use of natural gas as a substitute. It is anticipated that the demand for petroleum products in 2010 will be 980 KBD, an average increasing rate of 6.0% with increasing demand for all petroleum product types except for kerosene.

Given that EGAT has planned to reduce the use of fuel oil for power generation to only 5 KBD by 2010, the structure of petroleum product demand will change from that in 2000. That is, the share of

consumption by product type in 2010 will be as follows: diesel, 44.7%; gasoline, 20.5%; LPG, 13.4%; fuel oil, 10.6% (a decrease from 18.0% in 2000); jet, 10.7% and kerosene, 0.1%.

During the period 2000-2010, petroleum product production capacity of Thailand will be considerably higher than domestic demand. As a result, during the mentioned period, Thailand will be an exporter of petroleum products.

Table 2: Forecast on Petroleum Product Consumption

	Consumption (KBD)				Growth (%)			Share (%)		
Product Type	**1999**	**2000**	**2005**	**2010**	**2000**	**2001-05**	**2006-10**	**2000**	**2005**	**2010**
LPG	58	67	98	131	15.7	7.9	6.0	11.0	13.4	13.4
Gasoline	121	116	144	201	-3.9	4.4	6.9	19.0	19.7	20.5
Kerosene	1	1	1	0.8	-8.9	-5.4	-5.5	0.1	0.1	0.1
Jet Fuel	57	60	81	105	5.2	6.2	5.3	9.8	11.1	10.7
Diesel	264	257	326	438	-2.7	4.9	6.1	42.1	44.6	44.7
Fuel Oil	137	110	81	104	-19.7	-5.9	5.1	18.0	11.1	10.6
EGAT	65	41	5	5	-36.9	-87.8	0	6.7	0.7	0.5
Others	72	69	76	99	-4.2	2.0	5.4	11.3	10.4	10.1
TOTAL	**638**	**611**	**731**	**980**	**-4.2**	**3.7**	**6.0**	**100.0**	**100.0**	**100.0**

(b) Production of Petroleum Products: Production of petroleum products in 2000 was 708 KBD, a decrease of 0.6% from 1999. In this year, certain refineries, such as Thai Oil, Bangchak and Esso, did not operate at their full production capacity; the utilization ratio was merely at 88.2%.

The production in 2005 is estimated to be 821 KBD, accounting for an average increasing rate of 3.0% and that in 2010 to be 1,089 KBD, an average increasing rate of 5.8%. The production share of each petroleum product will be rather stable during 2000-2001. In the year 2010, the production share is expected to be as follows: diesel, 43.2%; gasoline, 19.1%; fuel oil, 15.7%; LPG, 11.0% and jet/kerosene, 11.0%.

Table 3: Forecast on Petroleum Product Production

	Production (KBD)				Growth (%)			Share (%)		
Product Type	**1999**	**2000**	**2005**	**2010**	**2000**	**2002-05**	**2006-10**	**2000**	**2005**	**2010**
LPG	77	88	110	120	14.3	4.6	1.8	12.4	13.4	11.0
Gasoline	149	139	155	208	-6.7	2.2	6.1	19.6	18.9	19.1
Jet/Kerosene	77	83	90	120	7.8	1.6	5.9	11.7	11.0	11.0
Diesel	274	277	334	470	1.1	3.8	7.1	39.2	40.7	43.2
Fuel Oil	135	121	132	171	-10.4	1.8	5.3	17.1	16.0	15.7
Total	**712**	**708**	**821**	**1,089**	**-0.6**	**3.0**	**5.8**	**100.0**	**100.0**	**100.0**

1.3 Oil Import Projection

For Thailand, the total consumption of crude oil in 1998 stood at an average of 708 KBD, down from 757 KBD for 1997. The crude oil import in 1998 was 679 KBD, down from 729 KBD in 1997. Thailand's level of dependence on imports in both years was at approximately 95% and is expected to

continue in the foreseeable future. The major source of crude oil for Thailand is the Middle East, which makes the economy more vulnerable to possible disruptions in oil supply from that region.

Table 4: Crude Oil Imports

Source	Unit: thousand barrels per day (KBD)			
	1997	**1998**	**1999**	**2000**
Middle East	562	574	557	500
Far East	141	96	104	132
Other Sources	26	9	39	43
Total Crude Import	**729**	**679**	**700**	**675**
Indigenous Crude	28	29	34	57
Total Crude Consumption	**757**	**708**	**734**	**732**

Presently, Thailand is a net exporter of petroleum products. However, with increasing consumption of petroleum products forecasted over the next 10 years and no significant refining capacity increases planned, Thailand is projected to become a net importer of petroleum products by the year 2010. This is reflected in the following table:

Table 5: Present and Projected Exports (Imports) of Petroleum Products

Product Type	Unit: thousand barrels per day (KBD)						
	1997	**1998**	**1999**	**2000**	**2001**	**2005**	**2010**
LPG	17	15	23	21	25	12	(11)
Gasoline	33	29	29	20	30	11	8
Kerosene/Jet Fuel	5	5	19	21	12	8	15
Diesel	(6)	26	15	18	18	8	31
Fuel Oil	(7)	(8)	10	3	25	51	67
Total	**42**	**67**	**96**	**83**	**110**	**90**	**110**

Note: Figures within ( ) represent net imports.

1.4 Existing Crude and Petroleum Products Storage

The present total storage capacity of crude oil in Thailand is approximately 28 Mbbl (million barrels) and the total storage of petroleum products (excluding LPG) is approximately 39 Mbbl. This brings the total existing storage capacity to approximately 67 Mbbl, equivalent to 110 days of consumption in 2000, well above the normal working requirements of 40-45 days. However, actual stocks are lower than the storage capacity.

The six refineries account for essentially all the crude oil storage in Thailand. The total storage of major petroleum products (excluding LPG) with these companies is at the level of 16.8 Mbbl. Apart from the refinery storage, a significant portion of the storage capacity of petroleum products is with oil traders and distributors.

Table 6: Summary of Oil Storage Capacity in Thailand

Item	Storage Capacity in million barrels (Mbbl)		
	Refineries	**Others**	**Total**
Products	**16.8**	**22.2**	**39.0**
Gasoline	4.1	5.9	10.0
Kerosene/Jet Fuel	1.9	2.5	4.4
Diesel	6.6	9.0	15.6
Fuel Oil	4.2	4.8	9.0
Crude Oil	**27.7**	**-**	**27.7**
Total	**44.5**	**22.2**	**66.7**

1.5 Mandatory Storage Level

At present, the only stockpiling is under the Fuel Act of 1978 which requires the private sector to stockpile a certain percentage of the annual throughputs/sales amounts.

For crude oil, both producers and importers were required to stock 5% of annual throughput (equivalent to about 18 days throughput) until December 1997. Marketers of petroleum products were also required to stock 5% of annual throughput until December 1997. Importers of petroleum products were required to stock 10% of annual imports (equivalent to about 36 days) until December 1996. For diesel and fuel oil, this requirement was reduced to 5% in December 1997.

Table 7: Oil Stockpiling Rates for Thailand

	Prior to Dec 96		Dec 96-Dec 97		Dec 97-Present	
	Production	**Import**	**Production**	**Import**	**Production**	**Import**
Crude Oil	5%	5%	5%	5%	3%	3%
Gasoline	5%	10%	5%	10%	3%	6%
Kerosene/Jet	5%	10%	5%	10%	3%	6%
Diesel	5%	10%	5%	5%	3%	6%
Fuel Oil	5%	10%	5%	5%	3%	6%

Notes:
- Stockpiling rates are given as percentage of total annual throughput or sales amounts.
- Stockpiling obligations are over and above the normal working volume requirements of the companies.
- Source: Department of Commercial Registration, Ministry of Commerce.

Due to the economic downturn in 1997, the mandatory stockpiling regulations require refineries to stock 3% of crude oil based on their throughput (equivalent to about 11 days) and marketers and importers to stock 3-6% of different petroleum products based on sales.

2. ENERGY SECURITY POLICY

Energy security policy remains the prime policy of the economy as currently 60% of domestic commercial energy consumption has to depend on imported energy, and it is projected to increase to 70% in the next decade. Therefore, it is important to promote domestic energy resource development, both petroleum and coal resources. However, since the potential of our domestic energy resources is quite low, in the long run, priorities will have to be given to energy cooperation with neighboring economies. So far, we have made several agreements with our neighboring economies on energy exploration and development for mutual utilization, including the construction of energy networks in this region to enhance the regional energy security.

2.1 Promotion of Indigenous Energy Resource Development

- **Domestic Oil**

The Thai government aims to promote and encourage the exploration and development of domestic petroleum resources, and encourage the application of petroleum information and modern technology so that the petroleum exploration and development of the economy would be continuous and more efficient.

Moreover, foreign and Thai investors are encouraged to engage in joint ventures on energy development projects at all stages of the business, for example, the crude oil transportation pipeline system, refineries, storage terminals, distribution terminals and other infrastructure.

- **Natural gas**

Another strategy is to promote and encourage the exploration and development of natural gas in the Joint Development Area (JDA) in compliance with the domestic demand and the development of other natural gas-based projects, for example, a joint venture project on natural gas development from the JDA and a joint venture project on the Trans-Thailand-Malaysia natural gas pipeline.

- **Coal**

Promotion of the exploration for additional coal resources to ensure adequate primary energy reserves for future use is encouraged, including speeding up concession granting to the private sector to develop coal mines initially explored by the Department of Mineral Resources.

- **Nuclear**

There is no plan to use nuclear energy at least in the next 10 - 15 years.

- **Hydro**

Hydropower has been developed for power generation since 1964. The potential of hydropower in Thailand is estimated at 15,155 megawatts (MW). As of June 2001, EGAT had 2,886 MW of installed capacity of hydropower, whereas the Department of Energy Development and Promotion (DEDP) and the Provincial Electricity Authority (PEA) operated 49 MW of installed capacity. The remaining hydropower resources are difficult to exploit due to the environmental impact on the resource areas a power project would entail. Therefore, future development of hydropower resources will be limited to a few small-scale projects which are considered most economical and environmentally friendly.

As part of the rural electrification program, bringing electricity to 98% of villages in Thailand by 1997, small hydropower sites have been identified as economically suitable for more accurate cost estimates and detailed engineering work. It should be noted, however, that a thorough feasibility study of a small hydropower project tends to indicate that the cost of electricity generated from a suitable hydropower site can be more economical than electricity generated from a set of photovoltaic plants. One way to further reduce the capital cost of a small hydropower plant is to run a commercially available pump as a turbine.

2.2 Diversification of Energy Supplies

Although oil will remain the major energy of the economy, with a ratio to the total demand of about 44% from 2001 to 2016, Thailand has emphasized diversification of energy supplies to secure a stable supply of energy. Natural gas and coal will gradually replace oil, particularly for use as fuel in power generation and in the industrial sector. Utilization of natural gas in power generation has been intensified since the year 2000. Imported coal will play an important role as fuel in power generation by Independent Power Producers (IPPs) from 2005 onwards.

(a) Power Purchase from Neighboring Economies

Negotiation with neighboring economies on energy development has been a means to provide an adequate amount of energy to satisfy the demand of the economy and to ensure the supply security. Thailand has executed Memorandum of Understandings and/or power purchase agreements with Lao PDR, Myanmar, the People's Republic of China and Cambodia.

(b) Promotion of Natural Gas Utilization

Resulting from the government's policy to promote the use of natural gas instead of fuel oil in power generation, utilization of natural gas in power generation continually increased from 42.3% in 1995 to 70% in 2001. A plan has been set to modify EGAT's power plants using fuel oil to be able to use natural gas instead.

Most of domestic natural gas fields are located in the Gulf of Thailand. Foreign sources include Malaysia-Thailand Joint Development Area (JDA), Yadana and Yetagun Fields in Myanmar.

It is expected that during the period 2000-2010, around 1,700-2,290 mmscfd of the total natural gas supply would be obtained from domestic sources while around 530-990 mmscfd would be imported from foreign sources.

(c) Promotion of Coal Utilization

Due to the comparatively low cost of supplies and low political risks of supply disruptions compared with other major energy sources, it is foreseeable that coal will remain a major fuel, next to natural gas, for electricity generation. Coal utilization by Independent Power Producers (or IPPs) is expected to start in 2005, when some IPP plants are scheduled to complete, at a level of about 3 million tons, and then is forecast to rapidly increase to 5.5 and 8.8 million tons in 2005 and 2010 respectively. For Small Power Producers (SPPs), coal demand is expected to be at a level of 2.15 million tons per year during the period 2000 to 2010.

To address the concern over the impact of coal utilization on the environment, the application of modern technology would also be encouraged so that utilization of coal in electricity generation and in the industrial sector would cause minimal impacts on the environment.

(d) Promotion of New and Renewable Energy

To ensure that there will be adequate energy for future use, consideration has been given to all potential energy resources that are both economically viable and environmentally friendly. Renewable energy is clean energy; however, its development as a large resource cannot be materialized and the production cost is still very high. Although renewable energy technologies have nowadays been more sophisticated and hence have helped to reduce some of the production costs, the overall costs are still high compared with those of commercial primary energy which is currently in use.

Consequently, the government has to take the role in promoting renewable energy technology development, using financial support from the Energy Conservation Promotion Fund (ENCON Fund). The ENCON Fund had provided financial support to promote renewable energy utilization, and renewable energy research and development. For example:

- Utilization of biogas technology in livestock farms to make use of manure, residues or wastewater. The produced biogas that can be used as a substitute energy source for liquefied petroleum gas (LPG), petroleum and electricity.

- Promotion of Photovoltaic (PV) Power System. The Thai government has a target to increase the electricity generating capacity by using the solar system at a minimum capacity of 17 MW nationwide by the end of 2006.

- Wind Energy. Wind is another source of energy that can be used instead of oil. However, there is still a lack of up-to-date data on wind energy potential and the distribution of wind resources in

Thailand. Therefore, a "Wind Map", or an assessment of wind energy nationwide, is being developed in order to determine the economic viability of wind energy and potential of wind resource development. Besides, a study is being carried out on wind energy potential at four places on the south coast of Thailand. If the wind energy in the targeted areas is high, a grid-connected wind farm for power generation will be installed, with an expected minimum generating capacity of 1,000 kW.

- Promotion of Small Power Producers (SPPs) Using Renewable Energy as Fuel.. During the fiscal period 2000-2004, an allocation of 2,060 million baht from the ENCON Fund will be used to promote and support SPPs using biomass or other forms of renewable energy (such as solar, biogas, municipal wastes) as fuel, in the form of pricing subsidies per unit of electricity (kWh) generated by renewable energy, on top of the EGAT's SPP purchasing price. The objective of this project is to maximize the use of domestic energy resources in power generation. This will help to reduce the government burden on imported energy and to reduce the adverse impact on the environment resulting from energy utilization. A target of 300 MW of generating capacity has been set for the first five years of the project.

(e) Other Measures to secure energy supply include:

- Support the joint development of the interconnection transmission networks and power purchase among the Greater Mekong Sub-region (GMS), in order to create mutual economic benefits and reliability of the power system.
- Support the cooperation in developing power generation projects, especially hydro-power projects and promote the private sector role in the power project development in the GMS.
- Accelerate negotiations with the governments of Vietnam and Cambodia concerning petroleum resources in contiguous or overlapping zones in the Gulf of Thailand so as to foster exploration and development of petroleum resources.
- Encourage the Thai energy companies to enter joint ventures on energy development abroad, which will help enhance the economy's energy supply security.

2.3 Improvement of Energy Efficiency

(a) Policy Measures

Promotion of efficient and economical use of energy is one challenge for which the government has formulated policies and strategies to achieve. This is because efficient and economical use of energy will help reduce not only investment requirements in energy supply but also fuel costs in various production processes. In this regard, basic policy measures to be implemented are pricing measures, provision of incentives, raising of the general public's awareness, and compulsory measures. Some examples of the implementation to achieve this goal are as follows:

- Pricing Measures.. The petroleum pricing structure has been revised so that it reflects the actual economic costs of supply. The current pricing mechanism that allows prices to fluctuate according to the market forces and competition will be maintained, without political intervention. Guidelines in determining natural gas prices and pipeline tariff are being worked out, and a clear and transparent regulatory system is being developed. The electricity tariff for both retail and wholesale levels has been improved in order to reflect the actual supply costs and to be transparent.

- Provision of Incentives. The Demand Side Management (DSM) Program has been established since 1993 to promote energy conservation and efficient use of electricity. Market transformation strategy has been introduced, that is, local manufacturers and importers are stimulated to produce and import energy-saving and efficient appliances while consumers are provided with education and energy conservation awareness through various media.

Several campaigns have been launched with emphasis placed on utilization of high-efficiency electric appliances, such as the voluntary labeling project for energy-efficient lighting equipment, refrigerators, air-conditioners and motors. The minimum energy efficiency standards is being established, initially for six products, namely, refrigerators, air-conditioners, motors, fluorescent lamp ballast, fluorescent tubes and compact fluorescent.

- Public Awareness Campaigns. Public relations campaigns have been implemented to motivate the general public to use energy efficiently and economically. The campaigns include various forms, such as the production of series of television commercials on energy conservation, dissemination of energy conservation issues through various types of media, energy camps for students, plays and cultural shows based on energy conservation themes and the establishment of energy information centers to disseminate materials, posters, and other printed matters on energy conservation and renewable energy related issues.

- Compulsory Measures. Factories and buildings with an installed electrical capacity of more than 1 MW or 1,175 kilovolt-amperes (kVA) are classified as "designated factories" and "designated buildings" that are required to implement energy conservation measures as specified by laws and regulations enforced under the Energy Conservation Promotion Act.

The owner of such a factory or building must conserve energy, audit and analyze energy utilization in his factory/building, in accordance with the standards, criteria and methods prescribed in relevant Ministerial Regulations. In this connection, the owner may request for a grant from the ENCON Fund to undertake the requisite energy conservation measures.

In addition, the ENCON Fund also provides financial support for the improvement in the design or construction of new government or state-enterprise buildings, with a view to conserving energy so as to demonstrate the outcome of such implementation to the general public.

(b) Implementation Mechanism

- **Energy Conservation Promotion Act, Energy Conservation Program, and Energy Conservation Promotion Fund**

The Energy Conservation Promotion Act (the Act) was passed by the government in March 1992 with mandates to promote energy conservation discipline and energy conservation investment in factories and buildings. This Act is seen as innovative as it blends incentives with mandatory regulations to facilitate the implementation of mandated energy-efficiency measures. Thailand's Energy Conservation Program is implemented under the Act.

One major tool of the government to promote energy conservation and use of renewable energy and to facilitate the implementation of energy-efficiency measures is the Energy Conservation Promotion Fund. The ENCON Fund provides financial support to government agencies, state enterprises, non-government organizations, individuals, and businesses that wish to implement measures to increase efficiency in energy utilization.

2.4 Emergency Preparedness of Oil Supply

- **Policy to Establish and Build Emergency Oil Stockpile**

The present stockpiling in Thailand consists only of mandatory storage requirements imposed on the oil companies based on throughput/sales.

However, with a view to ensuring the energy security of the economy, consideration on an official oil stock is currently being made. Thailand has undertaken a study on *National Oil Stockpiling Strategy* and we are now considering stockpiling options utilized in other economies in order to determine suitability and viability for application to Thailand as well as the optimum level of the long-term oil stockpiling together with appropriate implementation plan and institutional issues.

2.3 International Cooperation

Having bilateral/multilateral contracts with neighboring oil-exporting economies for the exchange of energy products in emergency cases is another means to ensure energy supply security and to protect the economy against oil crises.

(a) APEC

The world oil situation could be addressed from both the supply and the demand ends. The international oil price situation presents APEC with an opportunity to respond within the boundaries of its existing fields of cooperation. During the course of the past few years, due to concerted efforts of many APEC member economies, OPEC agreed to increase oil production at several intervals. However, prices have not been reduced to appropriate and sustainable levels. Accounting for a large proportion of the global oil consumption, APEC is better placed to address the demand side and bring oil supply and demand closer to equilibrium.

In mid-2000, Thailand pursued the diplomatic efforts urging greater APEC cooperation in the issue of oil and energy through the APEC Energy Working Group and APEC Senior Officials' Meeting mechanism. These efforts were carried out with the interest of both oil exporting and oil importing economies in mind with a view to creating stability of the oil market and oil prices as well as to enhancing steady and stable growth of the world economy.

With support from all APEC member economies, the energy security issue was finally addressed in the APEC Leaders' Declaration on the occasion of the Eighth APEC Economic Leader Meeting held in Brunei Darussalam, on 15-16 November 2000. In the APEC Leaders' Declaration, leaders addressed their concern on the energy security that *"We noted through the risks posed by oil price volatility to the world economic recovery and for developing economies that are heavily dependent on oil market conditions, and the need to stabilize prices at sustainable levels. We call for appropriate increases in supplies and other necessary measures to promote long-term price stability in the mutual interests of consumers and producers. We welcome the many ongoing cooperation activities within APEC which will help reduce vulnerability and promote market stability and note the efforts made this year by APEC members to address the volatility."*

(b) ASEAN

- **ASEAN Petroleum Security Agreement (APSA)**

Since the inception of the APSA in 1986, it has never been actually executed, although it was once nearly implemented during the Gulf war crisis. In severe crude oil and/or petroleum product supply disruptions affecting not only one single economy, but the whole region, the security of oil supplies from neighboring economies could become uncertain and threatened. The latter might not be able to increase their production fast enough and/or might decide to sell crude oil and petroleum products at an inflated price.

Therefore, following the Senior Officials' Meeting on Energy of the Eighteenth ASEAN Ministers on Energy Meeting (SOME of the 18th AMEM) in Hanoi, Vietnam, on 3 July 2000, the APSA is being reviewed by the ASEAN Council on Petroleum (ASCOPE). This agreement will help strengthen energy

security supply in time of crisis as it stipulates that any member economy whose normal supply drops to less than 80% of its normal requirements can ask the exporting members of ASEAN to supply 80% of said requirements.

- **ASEAN Energy Network**

Much progress has been achieved on the implementation of the *ASEAN Plan of Action for Energy Cooperation (1999-2004)*, which has served as the guide in the identification, formulation and implementation of specific projects and activities in the ASEAN energy sector. The major development of an integrated ASEAN energy network consists of the ASEAN Power Grid and the Trans-ASEAN Gas Pipeline projects.

- ASEAN Power Grid The success of implementation of the ASEAN Power Grid will enhance the potential for economic development in ASEAN as reliability of power supply will attract investors. Member economies will benefit from the fuel mix for power generation. Also, the success of this project implementation will necessitate sharing of technology, expertise and experience; all of this will facilitate further cooperation among ASEAN economies.

The development of transmission infrastructure, which is essential for energy trade, is highlighted to help sustain energy security, and the need to coordinate a framework for the establishment of an *ASEAN Power Pool* in the future. So far, there are three ASEAN Power Grid's interconnection projects that will be operational in the period 2001-2004, namely: Stage II links between Thailand-Peninsular Malaysia, Vietnam-Cambodia and Thailand-Cambodia. The interconnection between Peninsular Malaysia-Sumatra will also be implemented in the short term.

- Trans-ASEAN Gas Pipelines ASEAN gas pipelines are regionally considered an important element for further economic recovery and sustained development, regional energy security, and, at the same time, satisfying international requirements regarding the environment. So far, seven possible pipeline interconnection projects have been identified under the Trans-ASEAN Gas Pipeline Master Plan, involving a total length of about 4,500 km.

As natural gas has good combustion qualities and will lead to fuel savings and lower emissions, it is predicted that more gas-fired power plants will be established. So the regional demand for gas will significantly increase. Early completion of the Trans-ASEAN Gas Pipeline project will bring about better quality of life for ASEAN, apart from the energy supply security.

(c) ASEAN-METI

Cooperation between ASEAN and Japan in the areas of energy security planning, energy efficiency and conservation, and new & renewable energy was established last year. Under this cooperation framework, several meetings have been organized. Emphasis has been placed on the mutual exchange of information on "best practices" in the energy sector, in particular the development of a report on energy security policies and energy supply security planning in ASEAN. Thailand has been participating in these meetings to exchange information on energy situation with other participants.

(d) International Energy Agency (IEA)

Energy cooperation via energy dialogue and exchanges of energy information between Thailand and the IEA commenced in early February 2001. Subsequently, in April 2001 a meeting on *Improving Oil Data Transparency* was organized by the IEA in Thailand, where participants had an opportunity to express their views on problems encountered and received solutions proposed.

3. EMERGENCY MEASURES TO REMEDY OIL CRISIS

3.1 Elements of Emergency Preparedness

(a) Long-Term Measures

For any economy, enhancing oil security requires both long-term and short-term measures. Long-term measures could include:

- Diversification of oil supply sources,
- Improved oil use efficiency,
- Alternative energy sources,
- Improving market efficiency – privatization, liberalization of markets, removal of subsidies,

(b) Short-Term Measures

While long-term policy measures could reduce the risks of supply disruptions, alleviating the effects of an oil crisis, once it occurs, requires short-term measures. Emergency preparedness and response measures for the short-term are very important elements of a strategy for alleviating some of the effects of an oil crisis, especially for economies as heavily dependent on imports as Thailand. Short-term measures could include:

- Information sharing,
- Demand restraint,
- Fuel substitution (limited between oil and gas),
- Surge oil production, and
- Emergency oil stocks.

Among these measures, except for information sharing which is essential, emergency oil stocks seem to be the most important and useful means of dealing with an oil crisis because of the limited effectiveness of other measures for certain economies.

3.2 Thailand's Oil Security Policy

The present policy of Thailand is directed by the following:

- Oil stockpiling obligation on refineries and importers/marketers under the Petroleum Act (enacted in 1978);
- International cooperation: as detailed in Item 2.5.
- Implementation plan on remedy and prevention of shortage under the Emergency Decree (enacted in 1973): during a crisis, this decree provides the Prime Minister with extensive authority in issuing orders on production, distribution, export, import etc. of all types of liquid fuels. The decree also covers regulation or working hours and working days of business establishments.

3.3 Emergency Decree of 1973

The *Emergency Decree on Remedy and Prevention of Shortage of Petroleum Oil, B.E. 2516 (AD 1973)* provides the Prime Minister with extensive authority in designating measures to remedy and prevent shortage of petroleum products. Under the decree, the Prime Minister can issue orders on the following matters:

1) Production, distribution, export, import, etc. of all types of liquid fuels;
2) Production or distribution of electricity;

3) Consumption of fuel oil and electricity by regulating working hours and working days of business establishments; and
4) Rationing of all types of liquid fuels.

NEPO, as the central agency responsible for energy management and development in Thailand and reporting directly to the Prime Minister, has direct responsibilities to conduct, oversee, and coordinate actions in conformity with the legislation, which has thus far served as the enabling law for pricing petroleum products and for establishing the Oil Fund, which was created to subsidize LPG retail prices. NEPO also has direct responsibilities to manage the Oil Fund and to formulate policies and measures related to petroleum product prices and the Oil Fund. Revenue is generated for this Fund by imposing an extra tax on retail prices of gasoline, diesel and fuel oil. The current tax rates for this purpose are as follows:

Product		**Tax Rate to Oil Fund (Baht/litre) As of 5 Jan 2001**
Gasoline:	ULG 95	0.50
	ULG 91	0.30
	ULG 87	0.30
High Speed Diesel		0.50
Low Speed Diesel		0.50
Fuel Oil		0.06

The Emergency Decree was originally issued for a period of one year but has since been extended indefinitely. The provisions of the Decree have not been used so far and there are no detailed implementation plans.

3.4 Emergency Response Measures

A crisis, as defined by IEA, is a shortfall in supply to 93% or less of normal requirements and should trigger measures for curbing demand and increasing domestic supply, including:

- Applying fuel switching to the extent feasible to decrease the demand of crude oil and its derivatives.
- Limiting and eventually eliminating export of petroleum products. This should be coupled with international cooperation and sharing of information.
- Maximizing the production of domestic oil and gas to the extent feasible by utilizing surge production capacity.
- Demand restraint. There are various degrees of demand restraint measures as outlined in the following Table. Prior to a crisis, only Persuasion and Public Information measures are warranted. If a crisis sets in, Administrative Measures may be necessary. Finally, as a last resort, if a crisis persists for a long time, more severe measures including Allocation and Rationing may be utilized. It must be emphasized that curbing demand incurs a heavy penalty due to its negative effect on the GDP.
- Drawdown from the strategic reserve is perhaps the most important measure in a crisis. It has to be done in cooperation with other economies.
- Invoking APSA to provide additional supplies from oil producing ASEAN economies.

A more severe crisis (perhaps defined as shortfall to 90% or less of normal requirements) would require more severe measures. The most important measure, of course, would be drawing down on the strategic reserve.

Table 8: Degrees of Demand Restraint Measures

Persuasion and Public Information

Measure	Activity Targeted
Low cost persuasion campaign	Road Transport/Air Conditioning/ Lighting
Strong publicity campaign	Road Transport/Air Conditioning/ Lighting

Administrative Measures

Measure	Activity Targeted
Increased Surveillance of Existing Speed Limits	Road Transport
Compulsory Reductions in Cooling and Lighting in Public Buildings	Air Conditioning /Ambient Lighting
Car-Pooling	Road Transport
Reduction of Speed Limits	Road Transport
Sunday Driving Bans	Road Transport
Odd and Even License Plate Fueling Restrictions	Road Transport
Tax Increases on Petroleum Products	Specific Petroleum Products
Reduced Opening Hours of Service Stations	Road Transport

Allocation and Rationing Measures

Measure	Activity Targeted
Percentage Reduction Bulk Users	Crude Oil and Petroleum Products
Percentage Reduction to Retailers	Petroleum Products
Rationing with coupons to retailer or end users	Petroleum Products

4. CONCLUSION

Thailand recognizes the importance of emergency preparedness of energy supply since we have to depend substantially on energy import, especially oil. Emphasis has been placed on diversification of energy supplies and efficient and economical use of energy. Thailand's oil dependency has decreased a great deal from 93.6% in 1980 to 55.1% in 2000. As oil stockpiling would be crucial for the remedy of oil shortage or crisis, serious consideration is being given to establishing an official oil stock. Thailand has undertaken a study on *National Oil Stockpiling Strategy* and we are now considering stockpiling options utilized in other economies in order to determine suitability and viability for application to Thailand.

In addition, Thailand will continue supporting energy cooperation endeavors under various international frameworks. Also, we are willing to share energy information and exchange energy dialogue at both intra-regional and inter-regional levels with a view to strengthening the energy security in the region.